SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 18.—Sir Archibald Geikie, K.C.B., president, in the chair.—An attempt to detect some electro-optical effects: Prof. H. A. **Wilson.** The paper contains a description of some experiments made with the object of detecting possible effects due to electric and magnetic fields and moving matter on the velocity of propagation of light in glass. The results obtained were negative, but it seems worth while to publish a short account of the experiments. The optical part of the apparatus is a simple form of interferometer, which proved very easy and convenient to work with. It consists of a square glass frame made up of glass bars of square cross-section, cemented together with Canada balsam.—The influence of their state in solution on the absorption spectra of dissolved dyes: Dr. S. E. **Sheppard.** In the aqueous solutions of certain dye-stuffs—isocyanines, pinacyanols, cyanine—the dye is present partially or wholly in colloid solution, and the absorption spectrum is quite different from that of the true solution. The influence of various agencies, as heat, acid and alkali, electrolytes on the absorption was examined quantitatively. In other dye solutions the change from true solution to the colloid state is accompanied by broadening and diffusion of the absorption curve, consequent on the increase in number and size of the colloid particles. Deviations from Beer's law result. The state of dyes in solid media is comparable with that in liquid, and the absorption spectrum is similarly affected. The absorption of a number of dyes by membranes was studied. The solution of dyes appears to be a combined process of disaggregation of the solute, accompanied by a progressive combination with the solvent. If the same stage of solution is attained in *different* solvents, the absorption maxima are displaced according to Kundt's law.—The ferments and latent life of resting seeds: Jean **White.** The resting seeds of cereals such as wheat, maize, barley, oats, and rye all contain diastatic, fibrin-digesting, and ereptic ferments in appreciable amount. These ferments retain their activity without appreciable change in stored dry seeds for twenty or more years, that is, long after the power of germination has been lost, which takes place in wheat after eleven to sixteen years, barley eight to ten years, oats five to nine years, maize and rye more than five years. No relation was noted between the vitality of seeds and the persistence of enzymes in them, but since the enzymes persisted longer than the power of germination, the question as to whether germination could take place in the absence of any pre-existent enzymes remains to be answered. In any case no otherwise non-germinable seeds could be excited to germination by the addition of any kind of enzyme, and where the germination was feeble the addition of enzymes usually lowered the percentage germination and often delayed germination also to some extent. The erepsin appears to be more abundant than the pepsin, but otherwise in the cases of all three ferments greater differences are shown between different samples of the same age than between different seeds, or between the same seeds of varying ages. Pepsin appears, however, to be more abundant in rye than in any other cereal, and is almost absent from maize. Dry oats, barley, and wheat can in part resist a temperature of 99° C. to 100° C. for 1–4½ hours; after six hours' exposure all are killed, but the ferments are apparently unaffected. All the ferments are destroyed after an hour's dry heat at 130° C. to 131° C. The pepsin appeared to be least (one hour at 124° C.), the erepsin more (one hour at 124° C. to 128° C.), and the diastase, especially of barley, most resistant to dry heat (one hour at 124° C. to 131° C.). Two days' exposure to liquid air, although it delays the subsequent germination, and may also decrease the percentage, did not absolutely destroy any of the seeds tested, and did not appreciably affect the ferments in any of the cereals. The dry diastase of barley is therefore able to withstand a range of temperature of 200° C. to −130° C.; it is therefore thermally a highly stable chemical compound. Many seeds, including all cereals, give off appreciable quantities of carbon dioxide when stored in the air-dried condition, but others show no signs of respiration whatever. The respiration of air-dried wheat is especially pronounced, but in practically all cases every sign of respiration ceases when the seeds are moderately desiccated, although in the case of large seeds like maize minute traces of carbon dioxide may continue to escape for a time.

Geological Society, February 19.—Annual general meeting.—Prof. W. J. Sollas, F.R.S., president, in the chair.—Anniversary address: Prof. W. J. **Sollas.** The president dealt with the question of time, considered in relation to geological events and to the development of the organic world, referring, first of all, to recent evidence in proof of the extreme rigidity of the interior of the earth. He remarked that Mr. Strutt's method of estimating the age of sediments by reference to their radio-active constituents was of great promise, but a long series of concordant observations would be required to inspire absolute confidence in its results. Prof. Joly's method of determining the age of the ocean, based on the ratio of the amount of sodium which it contained to that annually contributed to it by rivers, was subjected to a detailed analysis, in the course of which it was pointed out that the sodium contained in river-water existed chiefly as sulphate or chloride, though theoretically it should be in the state of carbonate. The origin of the chlorine was manifold; some was traced to salts borne by the winds from the ocean, some to supplies from ancient desert-lakes and some to juvenile waters escaping as hot springs or impregnating the vadose waters underground. The probable limits for the age of the ocean were 80 to 170 millions of years. An examination of the sedimentary series, where developed to their maximum thickness, gave a period of 35 millions of years, on the assumption that deposition had proceeded at a rate of 1 foot in a century. Explanations of the discrepancy were suggested, and it was proposed to divide stratigraphical time into two moieties, each of 40 millions of years' duration. The earlier or pre-Cambrian moiety was termed the Protæon, the latter, or post-Cambrian, the Neatæon. Using the scale of 1 foot in 100 years as a rough chronological measure, it was applied to illustrate the rate of evolution in the case of the Equidæ and the chief varieties or species of man. Though relatively rapid, when considered in connection with some other groups of organisms, this was shown to be so slow, when measured in terms of years, that perceptible differences in a linear ancestral series would have required tens of thousands of years for their production.

February 24.—Prof. W. J. Sollas, F.R.S., president, in the chair.—Palæolithic implements, &c., from Hackpen Hill, Winterbourne Bassett, and Knowle Farm Pit (Wiltshire): Rev. H. G. O. **Kendall.** Implements are described from the localities mentioned in the title. Trimmed stones of eolithic nature were obtained from fields ploughed in Drift-gravels, together with abraded Upper Greensand chert, quartzite-pebbles, and small flints. Most of the flaked stones were found in shallow pits excavated in Drift-clay, exposed at the edges of the larger hollows. The implements are unabraded, abraded, and striated; evidently some are *in situ*, others were brought with the Drift. The implements are referred to the Chelléen period. While implements and flakes are numerous on the top of Hackpen Hill as compared with trimmed pieces, yet at Winterbourne Bassett plain implements and flakes are scarce, while trimmed pieces are numerous. Many of the latter have been re-chipped, and are of later date. Implements of at least three Palæolithic periods are found at Knowle.—The Karroo system in northern Rhodesia, and its relation to the general geology: A. J. C. **Molyneux.** In 1903 the author described deposits, that have since been recognised as of Karroo age, in southern Rhodesia. Here he traces their extension across the Zambesi, where their boundary follows the foot of the line of escarpments that divide the plateau from the low-lying regions of the Zambesi Valley. Karroo deposits also form the floor of the trench-like valleys of the Luangwa, Lukasashi, and Lusenfwa (or Luano), the walls of which are of rock-gneiss, schist, and granite. The Luano Valley is described, and the Lusenfwa and Molongushi rivers are followed in their courses across the plateau-plains. The Karroo deposits are grouped into basal conglomerates, Coal-measures, Upper Matobola beds, and escarpment series. In the Luano Valley, the conglomerates are made up of

resisting quartz-quartzite boulders and pebbles. Though they form the base of the Karroo system, there is no certain evidence of glaciation. In the Lukasashi and the Luano there is a dip of the strata north-westwards. Nowhere on the plateau in the vicinity of the valley-walls have Karroo beds been found. It is certain that the valleys were at one time filled almost to plateau-level, as the rivers pass through Archæan inliers by deep clefts. The late times in which the Machinga escarpment was laid bare, and the rejuvenation of the Lusenfwa River, suggest a filling of the valleys. It is possible that the Karroo beds extended over a part of the plateau, and were included in folding and faulting movements. Subsequently the surface was planed off to a plateau of remarkable monotony, and on a change of conditions taking place, erosion of the softer Karroo strata set in by which the present valleys are again reaching a plane of denudation. The trough-valleys of clastic rocks probably merely follow the axis of pre-Karroo and post-Karroo movements, trending in three directions. A distance of 800 miles displays movements that commenced in pre-Karroo periods, and have repeated themselves since the Karroo time. Fossils from the areas support the allocation of the deposits to the Permo-Carboniferous and to the Karroo system of South Africa. Palæolithic stone implements were found at separate localities on the surface, about the latitude of 14° 50′ S.—Plant-containing nodules from Japan, considered structurally in their relation to the "coal-balls" and "roof-nodules" of the European Carboniferous: Marie C. **Stopes.** The plant petrifactions are of a type unknown from the Mesozoic. The nodules are of Cretaceous age. They enclose well-petrified marine shells and plant-remains. Unlike the "coal-balls" and "roof-nodules," they are not contained in coal-seams or in the roof thereof, but occur in a thick series of shales below the coals, which appear to be of Tertiary age. Chemically they consist of about 60 per cent. of carbonates, both lime and magnesia being present, with 30 per cent. of silicates; the large proportion of silicates is a point of difference from the Carboniferous nodules. In having plant fragments in a single nodule, and in the type of petrifaction, the nodules are like coal-balls; in having marine shells included in the matrix they are more like roof-nodules. They probably represent fragments of tangled débris.

Royal Anthropological Institute, March 9.—Mr. Henry Balfour, past-president, and afterwards Sir Henry Howorth, in the chair.—The Veddas: Dr. C. G. **Seligmann.** A description was given of the manners and customs of these people. An interesting feature of these customs is the cult of the dead, which has given rise to a series of dances, often pantomimic in character, and so perhaps in the nature of imitative magic, and accompanied by offerings of food to the spirits of the departed. These dances are performed especially by men who have been trained to invoke the spirits of the dead. The use of a ceremonial arrow, with a blade more than a foot long and with a short handle, is an indispensable feature of some of these ceremonies, in all of which the chief actor becomes possessed by one or more of the spirits he invokes.

Royal Meteorological Society, March 17.—Mr. H. Mellish, president, in the chair.—Wind-waves in water, sand, and snow: Dr. Vaughan **Cornish.** Dealing first with waves of the sea, the lecturer described the gradual evolution of large sea-waves during the passage of a cyclone or other depression across the Atlantic. The great sea-waves are produced at that portion of the cyclone where the direction of the wind coincides with the direction of advance of the depression. Along this line of advance the waves in their gravitational progress are accompanied by a strong wind blowing across their ridges so long as the atmospheric depression maintains itself. Thus the waves are developed until they attain a considerable steepness. The average height attained by these waves (in feet) is about half the velocity of the wind (in miles per hour). Thus a wind of fifty-two miles per hour gives waves of an average height of about 26 feet, although individuals will then attain a height of 40 feet. In the circumpolar southern ocean the height of North Atlantic waves is somewhat exceeded, but the outstanding feature of the waves of high southern latitudes is their greater length from crest to crest. South of the Cape of Good Hope and of Cape Horn there is neither windward nor leeward shore, and the prevailing wind in all longitudes is westerly. Thus, wherever a westerly wind springs up it finds a long westerly swell, the effect of a previous wind, still running, and the principal effect of the newly-born wind is to increase the steepness of the already running long swell so as to form majestic storm-waves, which sometimes attain a length of 1200 feet from crest to crest. The longest swells due to wind are almost invisible during storms, for they are masked by the shorter and steeper waves. They emerge into view, however, after, or beyond, the storm, and Dr. Cornish has found their speed to be approximately equal to that of the wind by which they are created, sometimes attaining, even in the North Atlantic, a velocity of more than sixty miles per hour. Sand-waves are unable to travel by gravitation, as do the waves of the sea; their movements are entirely directed and controlled by the wind, and are therefore much simpler and more regular in form and movement than ocean-waves. When they grow to great size, as in the desert sand-dunes, which attain a height of several hundred feet, the forms become more complicated owing to the partial consolidation of the lower layers of sand by pressure. Nevertheless, the characteristic waveform can still be distinguished. Mackerel-sky is produced by the formation of an undulating surface where a lighter layer of air flows over a heavier one. The positive and negative of a rippled-cloud photograph were shown, and it was explained that the negative (showing the pattern, not of the clouds themselves, but of the unclouded sky between) was the true aërial "ripplemark," corresponding to sand-waves. Freshly fallen dry snow is drifted by wind in a procession of regular waves, similar to desert sand-waves, but less than half as steep, the wave-length being fifty times as great as the height. The flatness of the wind-formed snow-waves affords a valuable indication of the great distance to which hills give effective shelter from wind, and helps to explain the climatic advantages of certain localities.

Zoological Society, March 16.—Mr. F. Gillett, vice-president, in the chair.—Reports of the Grouse Disease Committee:—(*a*) the ectoparasites of the grouse; (*b*) the threadworms (Nematoda) of the red grouse (*Tetrao scoticus*); (*c*) the tape-worms (Cestoda) of the grouse. Appendix, parasites of birds allied to the grouse: Dr. A. E. **Shipley.** The author gave a general description of the work of the committee, and explained the results of the examination of the parasites of the grouse, exhibiting drawings and specimens to illustrate his remarks.—Fossilised remains of a small passerine bird, from the Lower Pliocene of Gabbro, near Leghorn: W. P. **Pycraft.** The remains most nearly resembled those of the living species known as Berthelot's pipit (*Anthus bertheloti*).—A collection of mammals from western Java, presented to the National Museum by Mr. W. E. Balston: Oldfield **Thomas** and R. C. **Wroughton.** The island of Java had been almost entirely neglected during the last sixty years, while it had been one of the most prolific sources of early described species, and in consequence workers had been much embarrassed for want of modern specimens representing these early species for comparison with their allies elsewhere. Now, thanks to the generosity of Mr. Balston, a very fine collection had been made in the island by Mr. G. C. Shortridge, and presented to the National Museum. It consisted in all of more than 1500 specimens, belonging to seventy-four species, of which six were new.

MANCHESTER.

Literary and Philosophical Society, February 9.—Prof. H. B. Dixon, F.R.S., president, in the chair.—Experiments on the ignition point of gases by the method of adiabatic compression suggested by Prof. Nernst: Prof. H. B. **Dixon.** In the first experiments tried the compression was effected in a strong glass tube, and photographs of the explosion were taken on a rapidly moving film. The photographs showed that the ignition was not set up instantaneously throughout the whole mass of compressed gas, but began at one point, which might be varied accord-

ing to the velocity of the piston. In a mixture of hydrogen and oxygen "detonation" is very rapidly set up, but not instantaneously. The later experiments were made in a steel tube, a window being inserted near the lower end of the tube so as to observe the flame produced.

February 23.—Prof. H. B. Dixon, F.R.S., president, in the chair.—A simple method of silvering transparent grating replicas, whether plane or mounted on curved surfaces: T. **Thorp.** The process is a modification of the quicksilver and tinfoil method used for ordinary mirrors before the wet silvering process had been discovered.—A preliminary account of the submerged vegetation of Lake Windermere as affecting the feeding grounds of the fish: Prof. F. E. **Weiss.** Some of the shallow feeding grounds of the trout and char have become overgrown by dense masses of weeds, with the consequence that the young fish cannot feed and are driven into deeper water, where they are devoured by pike and other enemies. An examination of the vegetation, undertaken at the suggestion of Mr. F. Nicholson, showed that it consisted chiefly of one of the brittleworts, *Nitella opaca*, the Canadian pondweed, *Elodea canadensis*, the water milfoil, Myriophyllum, and a large weed, *Potomogeton praelongus*. The first two were the most deleterious. Experiments made indicate that the best method of removal of the accumulated weed is by dragging the bay with fishing nets, such as are used for netting char. Other methods break up the plant, but as some of these weeds have very great powers of rooting from small broken fragments, such methods are not to be recommended.—The use of wind by migrating birds: F. **Stubbs.** The author criticised and combated the opinion very largely held that birds, when migrating, either fly against a head wind or with a side or beam wind. On the assumption of the head-wind theory it is evident that no bird can make headway against a wind that has greater velocity than its own speed of flight. A bird in air, like a swimmer in a strongly flowing river, is wholly in a moving supporting medium, and there is little doubt that, if a bird cannot find shelter, it will be more comfortable on the wing than on the ground during the progress of a storm, the reason being that, in the fiercest gales, the air, as a mass, is at rest. The bird then can fly about in any direction in this wind, but the direction of the wind may or may not coincide with that of the bird's flight. The author believes that birds habitually make use of cyclones as a means of travelling from one part of their range to another under the most favourable conditions for the exercise of flight.

DIARY OF SOCIETIES.

THURSDAY, MARCH 25.

ROYAL SOCIETY, at 4.30.—Liberation of Helium from Radio-active Minerals by Grinding: J. A. Gray.—The Expulsion of Radio-active Matter in the Radium Transformations: S. Russ and W. Makower.—*Sphaerostoma ovale*, n.gen., and *Crossotheca Grievii*, n.spec.: an Account of the Structure and Relations of the Reproductive Organs of *Heterangium Grievii*: Miss M. Benson.

ROYAL INSTITUTION, at 3.—On Aërial Flight in Theory and Practice: Prof. G. H. Bryan, F.R.S.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Electrical System of the London County Council Tramways: J. H. Rider.

ROYAL SOCIETY OF ARTS, at 4.30.—Native Man in Southern India: Edgar Thurston.

FRIDAY, MARCH 26.

ROYAL INSTITUTION, at 9.—Recent Results of Astronomical Research: A. S. Eddington.

PHYSICAL SOCIETY, at 5.—Note on the Production of Steady Electric Oscillations in Closed Circuits and a Method of Testing Radio telegraphic Receivers: Prof. J. A. Fleming, F.R.S., and G. B. Dyke.—The Effect of an Air Blast upon the Spark Discharge of a Condenser Charged by an Induction Coil or Transformer: Prof. J. A. Fleming and H. W. Richardson.—On the Action between Metals and Acids and the Conditions under which Mercury causes Evolution of Hydrogen: Dr. S. W. J. Smith.

SATURDAY, MARCH 27.

ROYAL INSTITUTION, at 3.—Properties of Matter: Sir J. J. Thomson, F.R.S.

MONDAY, MARCH 29.

ROYAL SOCIETY OF ARTS, at 8.—Steam Turbines: G. G. Stoney.

INSTITUTE OF ACTUARIES, at 5.—On the Annuity Business of British Offices and the Valuation Thereof: H. J. P. Oakley.

TUESDAY, MARCH 30.

ROYAL INSTITUTION, at 3.—The Evolution of the Brain as an Organ of Mind: Prof. F. W. Mott, F.R.S.

INSTITUTION OF CIVIL ENGINEERS, at 8.—*Further discussion*: Construction and Wear of Roads: A. Mallock, F.R.S.

FARADAY SOCIETY, at 8.—The Electro-analysis of Mercury Compounds with a Gold Kathode: Dr. F. Mollwo Perkin.—The Relation between Composition and Conductivity in Solutions of *meta*- and *ortho*-Phosphoric Acids: Dr. E. B. R. Prideaux.—A New Electrical Hardening Furnace: E. Sabersky and E. Adler.—Experiments on the Current- and Energy-Efficiencies of the Finlay Alkali Chlorine Cell: Dr. F. G. Donnan.

WEDNESDAY, MARCH 31.

ROYAL SOCIETY OF ARTS, at 8.—The Island of St. Helena: J. C. Mellis.

BRITISH ASTRONOMICAL ASSOCIATION, at 5.—Lord Kelvin on the Extent of the Universe: Gavin J. Burns.

THURSDAY, APRIL 1.

ROYAL INSTITUTION, at 3.—Aërial Flight in Theory and Practice: Prof. G. H. Bryan, F.R.S.

LINNEAN SOCIETY, at 8.—The Amphipoda Hyperiidea of the *Sealark* Expedition to the Indian Ocean: A. O. Walker.—The Marine Mollusca from the same Expedition: J. Cosmo Melvill.—The Land and Fresh-water Mollusca of the Seychelles Archipelago: E. R. Sykes.—On a Blind Prawn from the Sea of Galilee, *Typhlocaris galilea*, g. et sp. n.: Dr. W. T. Calman.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Electrical System of the L.C.C. Tramways: J. H. Rider. (*Adjourned discussion.*)—The Theory and Application of Motor Converters: H. S. Hallo.

RÖNTGEN SOCIETY, at 8.15.—The Origin, History and Development of the X-Ray Tube: J. H. Gardiner.

FRIDAY, APRIL 2.

ROYAL INSTITUTION, at 9.—Electrical Striations: Sir J. J. Thomson, F.R.S.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY, at 8.—Storms, and their Effect Upon the Sea Coast: Dr. J. S. Owens.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Reinforced Concrete on Railways: W. E. R. Gurney.

SATURDAY, APRIL 3.

ROYAL INSTITUTION, at 3.—Properties of Matter: Sir J. J. Thomson, F.R.S.

ESSEX FIELD CLUB (at Essex Museum of Natural History, Stratford), at 6.—The Head as an Index of Race: J. Gray.

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